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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,653	02/15/2006	David Ziger	US03 0286 US3	4562
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NXP, B.V. NXP INTELLECTUAL PROPERTY DEPARTMENT M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131				
EXAMINER				
LAPAGE, MICHAEL P				
ART UNIT		PAPER NUMBER		
2886				
NOTIFICATION DATE		DELIVERY MODE		
08/22/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary

Application No.

10/568,653

Applicant(s)

ZIGER, DAVID

Examiner

MICHAEL LAPAGE

Art Unit

2886

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14 and 20-23 is/are rejected.
- 7) ☒ Claim(s) 1-13, 15-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-23 are presented for examination.

Specification

2. The disclosure is objected to because of the following informalities:
 - a. Page 4, line 11 "IG. 11" should read –FIG. 11–.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Appropriate correction is required.

Drawings

3. The drawings are objected to because in Figure 4, the legend in the upper right hand corner lacks any labels, Further it appears that "220" was mistyped on the graph and should read --320--. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
4. Figure 1A, 1B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claims 1 and 9 recites the limitation "the periodicity" in line 9. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 14, it is unclear to the examiner what is meant by fitting sinusoidal components of the first and second UV reflectance spectrum. When looking to applicant's instant application (page 7, lines 26-28) it appears as though a key and critical element was left out of the claim and thus makes it unclear as to what the sinusoidal components of the first and second UV reflectance spectrum are being fit to. Therefore the examiner is interpreting that the sinusoidal elements are being fit to the cosine argument as detailed in instant applications claim 16.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 20 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Schiltz et al. (SPIE, Concept of two-dimensional swing curves for critical dimension prediction and optimization of resist/antireflective coating bilayers in topographic situations and Schiltz hereinafter).

As to claim 20, Schiltz discloses and shows in figure 4, a method for determining an approximately optimal thickness of a resist film on a wafer substrate, comprising the steps of:

depositing the resist film at a predetermined thickness on a first wafer substrate (page 776, right column, lines 1-5);

exposing the resist film to radiation and measuring a reflectance spectrum near the actinic wavelength (i.e. where the Prometrix 1050 measures reflectivity in the UV wavelength range) of the resist film, the reflectance spectrum having a periodicity (where as shown in figure 4, the reflectance spectrum inherently has a periodicity); and predicting (i.e. where one could predict from looking at the curves in figure 4) the periodicity of a swing curve from the periodicity of the reflectance spectrum (where as shown in figure 4, right graph, the period of the swing curve is found i.e. the minimum and maximum point define a period of a wave) (page 777, left column, lines 13-14; page 778, left column, lines 1-5; page 778, right column, lines 3-12).

As to claim 21, Schiltz discloses a method wherein, the periodicity of the swing curve is a function of incident angle of radiation, phase shift from reflective interfaces

Art Unit: 2886

within the wafer substrate, and exposure wavelength, and thickness of the resist film (page 778, right column; lines 6-12; where since the period of the swing curve is being measured all the other components of the swing curve as claimed are inherently part of the swing curve measurement being performed by the reference).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schiltz in view of Takahashi (U.S. Patent No. 5,960,023).

As to claim 22, Schiltz does not explicitly disclose a method, wherein the phase shift from reflective interfaces within the wafer substrate (i.e. laser substrate surface) is regressed from a quadratic function of wave number wherein, $\Delta = \Delta_0 + \Delta_1/\lambda + \Delta_2/\lambda^2$.

However, Takahashi does disclose in (col. 14, line 65 thru col. 15 line 6) where a quadratic function can be used to measure phase shift of reflective surfaces (i.e. laser cavity surfaces).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schiltz by using a quadratic equation in order to express phase shifts off reflected surfaces in order to provide the advantage of a functional way to express phase shifts for easy analysis.

12. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schiltz in view of Takahashi further in view of Hirose et al (U.S. PGPub No. 2002/0163649 A1) .

As to claim 23, Schiltz in view of Takahashi does not explicitly disclose a method, wherein the wavelength is dependent upon refractive index, wherein an effective refractive index is defined by a regression of a Cauchy expansion of the effective refractive index.

However, Hirose does disclose in ([104] and equation 5) where a Cauchy equation is used to approximate effectively the refractive index of the surface in question.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schiltz in view of Takahashi by using a Cauchy equation in order to express refractive index changes in order to provide the advantage of a efficient known and used equation for expressing the refractive index of the surface under test.

Allowable Subject Matter

13. Claims 1-13 are allowed.
14. Claim 14 and all dependent claims would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

The following is an examiner's statement of reasons for allowance:

As to claims 1, and 9 the prior arts of record taken alone or in combination with any other references fail to teach or suggest the claimed method of determining an effective **refractive index** as a **function** of the **periodicity** of the reflectance spectrum; determining a **periodicity** of a **swing curve** of the resist film coated on the second substrate based on the effective **refractive index**; is not rendered obvious by prior arts, the closest reference of record Schiltz does teach measuring the refractive index of the substrates but does not disclose correlating the refractive index to periodicity of the reflectance spectrum. Additionally Schiltz did not each determining the periodicity of the swing curve and only calculated the amplitude of the swing curves being evaluated.

As to claim 14, the prior arts of record taken alone or in combination with any other references fail to teach or suggest the claimed method of determining a first and a second effective refractive index at the actinic wavelength based on the **fitted sinusoidal components** of the first and the second **UV reflectance spectrum**; determining **minima** and **maxima** of a first and a second swing curve using the first and the second effective refractive index, respectively; and **determining corrected minima and maxima by averaging the minima and maxima of the first and the second swing curve** in combination with the rest of the elements of the claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Prior Art made of Record

15. The prior art made of record and not relied upon is considered pertinent to applicants disclosure.

a. Yang et al. (U.S. Patent No. 5,916,717) discloses a similar device for measuring the optimum thickness of a resist.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL LAPAGE whose telephone number is (571)270-3833. The examiner can normally be reached on Monday Through Friday 7:30AM-5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on 571-272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2886

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael LaPage/
Examiner, Art Unit 2886

/TARIFUR R CHOWDHURY/
Supervisory Patent Examiner, Art Unit 2886